

B: Amendments to The Claims:

Amend the claims to read as follows:

1 Claim 1. (Currently Amended) A multiprocessor computer
2 system, comprising:
3 a plurality of processing nodes and a plurality of
4 dynamic cache coherency regions using caches associated with
5 said processing nodes, and having
6 cache controller logic in said processing nodes
7 controlling ~~movement of~~ software-initiated movement of
8 software processes between said plurality of cache coherency
9 regions by changing coherency mode bits without requiring a
10 selective purging of cache contents in one or more of said
processing nodes and when moving a software process between
1 two distinct sets of processing nodes a cache line cannot be
2 marked as shared in two separate coherency regions, and when
3 said supervisor program is moving a coherency region from
4 one distinct set of processing nodes to another distinct set
5 of processing nodes it is effectively leaving behind cache
6 entries for the coherency region on the old nodes and
7 ensures that these old cache entries will be seen by
8 incoming storage requests originating from the new
9 processing nodes and that cache entries for the same main
10 storage addresses will not be established in the new
11 processing nodes until the old entries are invalidated.

1 Claim 2. (Currently Amended) The multiprocessor computer
2 system according to claim 1, including supervisor software
3 which enables said cache controller logic in a processing
4 node to be sure upon an incoming storage request of a
processor for a storage address that no copy of the
1 requested storage address exists outside that processor's

2 current coherency region, as specified by a ~~the~~ current
3 coherency region mode, whenever a cache entry for a
4 requested storage address is found to exist on any cache in
5 said processing nodes that contains ~~a~~ the processor that
6 initiated said incoming storage request.

1 Claim 3. (Original) The multiprocessor computer system
2 according to claim 2, wherein said supervisor software
3 creates a unique Coherency Region ID for each process that
4 has its own coherency region.

1 Claim 4. (Original) The multiprocessor computer system
2 according to claim 2, wherein supervisor software creates a
3 table for each processing node in the system which has an
4 entry for every Coherency Region ID that is currently
5 allowed to be dispatched on said processing node.

1 Claim 5. (Original) The multiprocessor computer system
2 according to claim 2, wherein said supervisor software
3 creates a unique Coherency Region ID for each process that
4 has its own coherency region and one or more coherency mode
5 bits for each processor in the multiprocessor computer
6 system, and said coherency mode bits and coherency region ID
7 associated with a processor are sent together with each
8 storage transaction that is initiated by that processor when
9 the transaction is transmitted for communication to another
10 processor of said multiprocessor computer system.

1 Claim 6. (Original) The multiprocessor computer system
2 according to claim 2, wherein said supervisor software
3 creates a unique Coherency Region ID for each process that
4 has its own coherency region and one or more coherency mode
5 bits for each processor in the multiprocessor system to

6 to a node controller for a processing node.

1 Claim 7. (Original) The multiprocessor computer system
2 according to claim 2, wherein said supervisor software
3 creates a unique Coherency Region ID for each process that
4 has its own coherency region and one or more coherency mode
5 bits for each processor in the multiprocessor computer
6 system, and wherein said mode bits associated with each
7 transaction are used to determine which caches must
8 participate in any storage transactions that they receive
9 from any of the processors of said multiprocessor computer
10 system.

1 Claim 8. (Original) The multiprocessor computer system
2 according to claim 2, wherein said supervisor software
3 creates a unique Coherency Region ID for each process that
4 has its own coherency region and one or more coherency mode
5 bits for each processor in the multiprocessor computer
6 system and enables multiple cache coherency regions to
7 operate without the use of cache purges during some
8 operations which move software processes between coherency
9 regions.

1 Claim 9. (Currently Amended) The multiprocessor computer
2 system according to claim 8, wherein said supervisor
3 software moves a software process out of one coherency
4 region that is no longer going to be used by said software
5 process and into another ~~software process~~ coherency region
6 that has been created to cover the same address space as the
7 first but which will include a new set of processing nodes.

1 Claim 10. (Original) The multiprocessor computer system
2 according to claim 2, wherein said supervisor software

3 creates a unique Coherency Region ID for each process that
4 has its own coherency region and moves a software process
5 from one coherency region encompassing one set of processing
6 nodes to another coherency region encompassing another set
7 of processing nodes without requiring cache purges of caches
8 in any of the processing nodes.

1 Claim 11. (Original) The multiprocessor computer system
2 according to claim 10, wherein if said another coherency
3 region contains fewer hardware processing nodes than the
4 original coherency region, the size of the coherency region
5 for said processing nodes has been effectively been reduced.

1 Claim 12. (Currently Amended) The multiprocessor computer
2 system according to claim 1, wherein said multiprocessor
3 computer system having a plurality of said ~~processing~~
4 processing nodes uses a table of active coherency region
5 information associated with each processing node to
6 determine when to alter the processing nodes' cache state
transitions.

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2 Claim 13. (Original) The multiprocessor computer system
3 according to claim 12, wherein a supervisor program
4 initializes said tables associated with each processing node
5 and an entry in said table is made for each coherency region
6 that the supervisor program intends to use on that
processing node.

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2 Claim 14. (Original) The multiprocessor computer system
3 according to claim 1, wherein a supervisor program assigns a
4 unique coherency region ID for each coherency region which
5 the supervisor can associate with all software processes

6 that access storage addresses that are encompassed by the
7 coherency region.

1 Claim 15. (Original) The multiprocessor computer system
2 according to claim 1, wherein processing nodes are able to
3 identify incoming storage requests which target lines that
4 are no longer part of the address space of any software
5 process that is currently enabled by the supervisor software
6 to be dispatched on the node.

1 Claim 16. (Original) The multiprocessor computer system
2 according to claim 1, wherein processing nodes are able to
3 identify incoming storage requests which target lines that
3 are no longer part of the address space of any software
4 process that is currently enabled by the supervisor software
5 to be dispatched on the node to thereby identify cache lines
6 that are no longer actively used by any software processes
7 on that processing node and to change the cache entries for
8 that processing node to invalid in response to a storage
9 request from outside the coherency region.

1 Claim 17. (Original) The multiprocessor computer system
2 according to claim 1, wherein processing nodes are able to
3 identify incoming storage requests which target lines that
4 are no longer part of the address space of any software
5 process that is currently enabled by the supervisor software
6 to be dispatched on the node and allows all of the caches in
7 said multiprocessor computer system to continue processing
8 coherency transactions while the coherency boundaries for a
9 software process are effectively changed.

1 Claim 18. (Original) The multiprocessor computer system
2 according to claim 1, wherein processing nodes are able to

3 identify incoming storage requests which target lines that
4 are no longer part of the address space of any software
5 process that is currently enabled by the supervisor software
6 to be dispatched on the node such that cache lines belonging
7 to a software process that is no longer actively being
8 dispatched on a given processing node are identified and
9 invalidated thereby enabling their reuse.

1 Claim 19. (Original) The multiprocessor computer system
2 according to claim 1, wherein a supervisor software uses
3 processor state information to determine which caches in the
4 multiprocessor computer system are required to examine a
5 coherency transaction produced by a single originating
6 processor's incoming storage request.

1 Claim 20. (Currently Amended) The multiprocessor computer
2 system according to claim 19, wherein a processing node of
3 the multiprocessor computer system ~~has~~ has dynamic coherency
4 boundaries such that the multiprocessor computer system uses
5 only a subset of the total processors in a system for a
6 single workload at any specific point in time and can
7 optimize the cache coherency as the supervisor software
8 expands and contracts the number of processors which are
9 being used to run any single workload.

1 Claim 21. (Original) The multiprocessor computer system
2 according to claim 20, wherein multiple instances of
3 processing nodes can be connected with a second level
4 controller to create a large multiprocessor system.

1 Claim 22. (Original) The multiprocessor computer system
2 according to claim 21, wherein said supervisor software
3 creates a unique Coherency Region ID for each process that

4 has its own coherency region and one or more coherency mode
5 bits for each processor in the multiprocessor computer
6 system and enables multiple cache coherency regions to
7 operate without the use of cache purges during some
8 operations which move software processes between coherency
9 regions and a node controller uses said mode bits to
10 determine which processors must receive any given
11 transaction that is received by the node controller.

1 Claim 23. (Original) The multiprocessor computer system
2 according to claim 22, wherein a second level controller
3 uses the mode bits to determine which processing nodes must
4 receive any given transaction that is received by the second
5 level controller.

1 Claim 24. (Original) The multiprocessor computer system
2 according to claim 21, wherein said supervision software
3 uses logical partitions which are mapped to allowable
4 physical processors and a distinct cache coherency region
5 can be defined for each partition using a hypervisor.

1 Claim 25. (Original) The multiprocessor computer system
2 according to claim 2, wherein said coherency region ID is
3 used to perform the function of a cache coherency mode and a
4 node controller determines which physical processing nodes
5 are associated with specific coherency region IDs.

1 Claim 26. (Original) The multiprocessor computer system
2 according to claim 3, wherein any incoming storage request
3 which misses all of the caches in an originator's coherency
4 region is then sent on to all processing nodes in the entire
5 system, regardless of the setting of said mode bits.

1 Claim 27. (Currently Amended) The multiprocessor computer
2 system according to claim 3, wherein any incoming storage
3 request which requests ~~Requests~~ which hit in an originator's
4 coherency region but which do not have a correct cache state
5 do not need to be sent outside the coherency region.

1 Claim 28. (Currently Amended) A method for use in a
2 multiprocessor computer system, comprising the steps of:
3 moving software processes between a plurality of
4 cache coherency regions for caches associated with a
5 plurality of processing nodes of said multiprocessor
6 computer system without requiring a selective purging of
7 cache contents in one or more of said processing nodes,
8 after supervisor software creates a unique Coherency Region
9 ID for each process that has its own coherency region, and
10 said supervisor software creates a table for each
11 processing node in the ~~multi-processor~~ multiprocessor computer
12 system which has an entry for every Coherency Region ID that
13 is currently allowed to be dispatched on said processing
node.

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2 Claim 29. (Original) The multiprocessor computer system
3 according to claim 28, wherein said coherency mode bits and
4 coherency region ID associated with a processor are sent
5 together with each storage transaction that is initiated by
6 that processor with a requested storage address when the
7 transaction is transmitted for communication to another
processor of said multiprocessor computer system.

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2 Claim 30. (Original) The multiprocessor computer system
3 according to claim 28, including a step of enabling with
4 supervisor software the multiprocessor computer system's
5 cache controller logic in a processing node to be sure that,

6 upon receipt at said processing node that an incoming
7 storage request for a storage address, no copy of the
8 requested storage address exists outside said processing
9 node's current coherency region, as specified by a current
10 coherency region mode, whenever a cache entry for a
11 requested storage address is found to exist on any cache in
12 any of said multiprocessor computer system's processing
13 nodes that contains a processor that initiated said incoming
storage request.

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2 Claim ~~27~~ 31. (RENUMBERED AND CANCELED) ~~The multiprocessor~~
3 ~~computer system according to claim 3, a cache line cannot be~~
4 ~~marked as shared in two separate coherency regions, and when~~
5 ~~said supervisor program is moving a coherency region from~~
6 ~~one distinct set of processing nodes to another distinct set~~
7 ~~of processing nodes it is effectively leaving behind cache~~
8 ~~entries for the coherency region on the old nodes and~~
9 ~~ensures that these old cache entries will be seen by~~
10 ~~incoming stroage requests originating from the new~~
11 ~~processing nodes and that cache entries for the same main~~
12 ~~storage addresses will not be established in the new~~
~~processing nodes until the old entries are invalidated.~~